Big Flat Creek was one of 28 streams found eligible for Wild and Scenic River designations.

3.6.3 Areas of Critical Environmental Concern

3.6.3.1 Applicable Regulatory Framework

Areas of Critical Environmental Concern (ACECs) are areas of public land where special management attention is required to protect important natural and/or cultural resource values. The ACEC designation indicates to the public that the BLM recognizes these significant values, and has established special management measures to protect them. The BLM is required to consider designation of ACECs under Section 202(c)3 of the Federal Land Policy and Management Act (CFR 1610.7-2). Areas may be nominated for consideration as ACECs by the BLM, other agencies, or members of the public.

In order for an area to be designated as an ACEC, both of the following criteria must be met:

- **Relevance:** The area must have a significant cultural, historic, scenic, wildlife, fish, or other natural system or process.
- **Importance:** The above value, resource, process or system must be distinctive and be of greater than local significance.

Areas with significant natural hazards may also be designated as ACECs, although no areas meeting these criteria are known to exist within the KRNCA.

The KRNCA currently has one designated ACEC: The Mattole ACEC, which was designated in the King Range Extension Plan (1981) to protect significant archaeological sites, the fragile sand dune ecosystem, and riparian areas/ wildlife values in the Mattole Estuary. The original ACEC encompassed 350 acres. (Federal Register Vol. 54 no. 249, 12/29/89). The ACEC was expanded in a 1996 Plan Amendment to include 305 acres of newly acquired lands on the north side of the Mattole Estuary The ACEC extends from the public land boundary north of the Mattole Estuary south for 7.5 miles to Sea Lion Gulch (see Figure 3-9).

3.7 WATER QUALITY

3.7.1 Applicable Regulatory Framework

Numerous factors can affect water quality within the KRNCA, including road construction and maintenance, land management practices, water consumption, pollution spills, and waste disposal practices. Water quality impacts from each of these activities are regulated under both federal and state laws.

The primary federal laws that are pertinent to water quality in the King Range include:

- The Clean Water Act and amendments (CWA)
- The Safe Drinking Water Act and amendments (SDWA)
- The Resource Conservation and Recovery Act (RCRA)

The U.S. Environmental Protection Agency has granted primacy to the State of California to implement portions of both the Clean Water Act and the Safe Drinking Water Act. The California state laws and regulations that are pertinent to water quality in the King Range include:

- The Porter-Cologne Water Quality Control Act
- The California Water Code
- The California Fish and Game Code
- The California Health and Safety Code

The BLM is required to comply with the above laws and regulations. The regulatory agencies that are primarily responsible for oversight of BLM's activities as related to water quality are the State Water Resources Control Board (SWRCB), the California Regional Water Quality Control Board—North Coast Region (RWQCB), the California Department of Health Services—Office of Drinking Water (CDHS), and the U.S. Environmental Protection Agency.

3.7.2 Existing Conditions and Management Practices

3.7.2.1 Surface Water

In general, watersheds within the King Range have experienced relatively little development compared to surrounding watersheds. For this reason, creeks, streams, and rivers in the King Range offer quality habitat for numerous aquatic species. Section 303(d) of the Clean Water Act requires each state to identify streams, rivers and lakes that do not meet water quality standards even after the implementation of technology based controls. The Mattole River is the only major water body in or adjacent to the King Range that has been listed as impaired on the State of California's Clean Water Act 303(d) list. The SWRCB and RWQCB identified excessive sedimentation and elevated temperature as causes for the impairment. As such, the BLM is required to minimize any action in the Mattole watershed that would threaten to further exacerbate temperature or sediment problems in the Mattole River or its tributaries.

As a major landowner in the Mattole River watershed, some of the BLM's activities will likely be regulated under the prescribed Total Maximum Daily Load for the watershed.

One of the primary factors affecting increased water temperature is reduced flow, especially during the warmer summer months when base flows in the Mattole River's tributary streams and the river are relatively small. Decreased base flow results from upstream diversion of springs and streams. Removal of riparian vegetation can result in increased solar radiation falling on the channel. Discharge of sediment from failing or improperly designed roads, forest fires, and poor land management practices can result in excessive sedimentation of the channel, reduction of available spawning habitat, and reduced effective channel depth. Relatively small changes in these individual factors can combine to result in large reductions in available cold water fish habitat.

3.7.2.2 Groundwater

Due to the abundance of surface water, groundwater sources have not traditionally been relied upon in the King Range area. However, due to increasing sensitivity regarding drinking water quality and the potential environmental effects of excessive surface water diversions, the BLM has begun to increase its reliance on groundwater in the King Range. Specifically, the Mattole Campground potable water supply relies upon a groundwater well, and another well is planned for the King Range Administrative site. In those areas where groundwater wells are or will be installed to provide water to the public, the BLM is required to implement a wellhead protection plan to ensure that operations do not impair groundwater quality. The benefits of groundwater over surface water include increased in-stream flow for aquatic habitat, reduced treatment requirements for public water supplies, and reduced wear and maintenance of water supply system equipment. Compliance with drinking water law and regulations is described further under Facilities

3.7.2.3 Water Pollution

The BLM does not have and does not envision any operations in the King Range that would involve permitted point-source discharges under the Clean Water Act and the National Pollutant Discharge Elimination System (NPDES). The only potentially regulated non-point source discharge in the King Range results from operations at the King Range office in Whitethorn, CA. Although existing laws and regulations do not require this facility to operate under the State of California's general NPDES permit for stormwater discharges, the facility has a stormwater pollution prevention plan that specifies management practices intended to minimize water quality impacts resulting from operations at the facility. In the unlikely event that new construction will result in more than one acre of ground disturbance, the BLM will file a Notice of Intent to the RWQCB indicating that discharges resulting from the construction project will be managed in accordance with the requirements in the applicable general NPDES permit.

Waste generation and disposal practices can also result in water pollution. The BLM currently disposes of all waste in a proper manner, as required by state and federal laws. All wastewater generated in the King Range is considered domestic sewage and, except for the King Range Administrative Facility, is either discharged to the Shelter Cove wastewater collection system or is pumped from pit toilets and properly disposed by a licensed hauler. The King Range Administrative Facility discharges its waste to a septic system.

3.7.2.4 Watershed Restoration

In general, watershed restoration for water quality issues focuses on the upgrading, reshaping and/or abandonment of outdated roads. Many of these older roads were constructed in a manner that now create significant potential for the road to wash out or fail and deliver large volumes of sediment into streams that support anadromous fisheries. Although restoration efforts are undertaken for the purpose of reducing sediment discharges to these streams, road maintenance, reshaping, and abandonment activities can also cause incidental sediment discharges. The BLM employs erosion control measures, frequently termed "best management practices" (BMPs), as needed during watershed restoration activities to reduce or eliminate incidental sediment discharge. Some of the BMPs include mulching, installation of sediment curtains, placement of hay bales, and other drainage control features, construction of rolling dips, and seasonal limits on operations.

3.8 AQUATIC ECOSYSTEMS AND FISHERIES

3.8.1 Introduction

The KRNCA provides habitat for salmon and steelhead listed as "threatened" under the federal Endangered Species Act (ESA). The fish were listed by Evolutionarily Significant Units (ESUs). The four ESUs are: Southern Oregon/Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal (CC) Chinook salmon (*O. tshawytscha*), Central California (CC) coho salmon (*Oncorhynchus kisutch*), and Northern California (NC) steelhead (*O. mykiss*), hereinafter referred to as Pacific salmonids. Available information indicates that KRNCA salmonid habitat is recovering from the combined impacts of relatively recent flood events and past land uses, and riparian vegetation has re-established in the impacted area. However, in logged areas, climax communities along streams will not return to pre-harvest levels for centuries affecting recruitment of large wood to streams. Instream habitat quality and quantity has been reduced due to past land use practices, severely impacting salmonid populations. Restoration efforts, changes in land use patterns and riparian protection standards, and public ownership of lands has allowed instream habitat to begin recovering. Sedimentation from roads continues to be a primary impact to salmonid habitat, although impacts have been reduced through cooperative road maintenance efforts between public and private landowners, road restoration efforts, and broad scale transportation management and maintenance programs.

3.8.2 Applicable Regulatory Framework

The KRNCA provides habitat for the following federally listed Pacific salmonids:

- Southern Oregon/Northern California Coasts (SONCC) coho salmon (*Oncorhynchus kisutch*); listed under the Endangered Species Act (ESA) as threatened (62 FR 24588; May 6, 1997). Designated critical habitat (64 FR 24049; May 5, 1999) encompasses accessible reaches of all rivers between the Mattole River in California and the Elk River in Oregon, inclusive.
- Central California (CC) coho salmon (*O. kisutch*); listed under the ESA as threatened (61 FR 56138; October 31, 1996). Designated critical habitat includes accessible reaches from Punta Gorda, within the KRNCA, south to the San Lorenzo River in central California. However, this species has not been documented within streams draining the KRNCA.

- California Coastal (CC) Chinook salmon (*O. tshawytscha*); listed under the ESA as threatened (64 FR 50394; September 16, 1999). Designated critical habitat (65 FR 7764; February 16, 2000) was withdrawn in 2002.
- Northern California (NC) steelhead (*O. mykiss*); listed under the ESA as threatened (65 FR 36094; June 7, 2000), no critical habitat designated.

Section 7 of the federal Endangered Species Act requires BLM to enter into consultation with NOAA Fisheries for any discretionary federal action which may affect the above federally listed Pacific salmonids or designated critical habitat. Furthermore, Section 7 directs the BLM to carry out conservation programs to aid in the protection and recovery of these species.

In addition to critical habitat designations for listed Pacific salmonids, Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Act (MSA, as amended 1996) require heightened consideration of habitat for commercial species in resource management decisions, including EFH for SONCC coho salmon and CC Chinook salmon. EFH is defined in Section 3 of the MSA as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) interprets EFH to include aquatic areas and their associated physical, chemical, and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem. Freshwater EFH for Pacific salmonids includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers, and long-standing impassable natural barriers. The MSA and its implementing regulations at 50 CFR 600.92(j) require that before a federal agency may authorize, fund or carry out any action that may adversely effect EFH, it must consult with NOAA Fisheries. The KRNCA contains EFH for coho and Chinook salmon.

Finally, the Mattole watershed is one of eight Key Watersheds identified in the Northwest Forest Plan Record of Decision (1994) within the Coastal Province.

3.8.3 Existing Conditions

Habitat for Pacific salmonids within the KRNCA can be divided into two main regions: the east side of the KRNCA contains approximately twelve percent of the Mattole River watershed, and the western portion contains seventeen coastal streams that drain directly into the Pacific Ocean. The mainstem of the Mattole is approximately 62 miles in length, and has over 74 tributaries. The KRNCA contains approximately 56 miles of the 193 miles of anadromous habitat within the Mattole River watershed, and includes streams that contribute significantly to salmonid production in the Mattole River basin (see Figure 3-11).

Runs of Pacific salmonids in the Mattole River basin have declined drastically in recent decades. Anecdotal evidence as recent as the 1970s indicates that salmonids were so numerous that they could be speared, snagged, or netted at numerous locations along the lower river. CDFG (1965) estimated spawning escapement numbers at 5,000 Chinook salmon, 2,000 coho salmon, and 12,000 steelhead. Redd surveys and carcass counts conducted by watershed restoration groups since 1981 indicate that a few hundred pairs of spawners utilize the Mattole River and that steelhead is the primary species in the

Mattole River basin. It is estimated that steelhead numbers in the Mattole have declined less drastically than coho and/or Chinook salmon. Peak numbers of steelhead were observed in the estuary/lagoon in September 1994: 3,000 young-of-the-year, and 7,000 yearlings. Results of these surveys as well as previous studies of the Mattole estuary by Busby et al. (1988), indicate that rearing habitat in the Mattole estuary/lagoon is of poor quality due to lack of deep water habitat, high water temperatures, and poor food resources. Spawning surveys have been conducted in Bear, Honeydew, and Mill Creeks by watershed groups and have documented adult steelhead spawning. Bear Creek was stocked with steelhead and rainbow trout in the 1930s and in 1972, and the Mattole Watershed Salmon Group has implemented hatchbox programs for Chinook and coho salmon in Bear Creek since 1982.

The salmon fishery is an important part of the identity and culture of the region.
Source: Anne Machi Collection.

3.8.3.1 Species Accounts

Coho Salmon (*Oncorhynchus kisutch*)

General life history information and biological requirements of SONCC coho salmon have been described in various documents (Shapovalov 1954; Hassler 1987; Sandercock 1991; Weitkamp et al. 1995) as well as NOAA Fisheries' final rule listing SONCC coho salmon (May 6, 1997; 62 FR 24588). Adult coho salmon typically enter rivers between September and February. Spawning occurs from November to January (Hassler 1987), but occasionally as late as February or March (Weitkamp et al. 1995). Coho salmon eggs incubate for 35-50 days between November and March. Successful incubation depends on several factors including dissolved oxygen levels, temperature, substrate size, amount of fine sediment, and water velocity. Fry start emerging from the gravel two to three weeks after hatching and move into shallow areas with vegetative or other cover. As fry grow larger, they disperse up or downstream. In summer, coho salmon fry prefer pools or other slower velocity areas such as alcoves, with woody debris or overhanging vegetation. Juvenile coho salmon over-winter in slow water habitat with cover as well. Juveniles may rear in fresh water for up to 15 months then migrate to the ocean as "smolts" from March to June (Weitkamp et al. 1995).

In preparation for their entry into a saline environment, juvenile salmon undergo physiological transformations known as smoltification to adapt them for their transition to salt water. Coho salmon adults typically spend two years in the ocean before returning to their natal streams to spawn as three-year olds.

Available historical data and most recent published coho salmon abundance for California are summarized by NOAA Fisheries status review update (NOAA Fisheries Southwest Fisheries Science Center 2001). The number of streams with coho salmon present within the SONCC ESU was found to have declined from 1989-2000. In the CC ESU the number of streams identified as having historical coho salmon presence generally ranged between 44 to 48 percent from 1989-2000. The decline of SONCC coho salmon is not the result of one single factor, but rather a number of natural and anthropogenic factors that include dam construction, instream flow alterations, and land use activities coupled with large flood events, fish harvest, and hatchery effects.

All coho salmon stocks between Punta Gorda and Cape Blanco are depressed relative to past abundance, but there are limited data to assess population numbers and trends. The Mattole Salmon Group implemented coho salmon enhancement projects in Mill Creek from 1981 to 1987, and this tributary has provided the only known spawning and rearing habitat for coho salmon in the lower 27 miles of the Mattole. There were an estimated 500 spawners in 1981-1982, a peak of greater than 1,000 spawners in 1987-1988, and less than 200 spawners in 1994-1995. In 1987, a hatchbox program for coho salmon was implemented by watershed groups in an attempt to avoid the extinction of native Bear Creek coho salmon. Although the range of CC coho salmon overlaps the KRNCA from Punta Gorda south, coho salmon have not been documented in available habitat (coastal streams that drain directly into the Pacific Ocean) except for occasional observations of a few individuals. These streams may not be suitable (too steep, etc.) for utilization by CC coho salmon.

Chinook Salmon (*O. tshawytscha*)

NOAA Fisheries' (Meyers et al. 1998) status review of Chinook salmon contains information on the biological requirements of Chinook salmon. In summary, Chinook salmon mature between 2 and 6+ years of age (Myers et al. 1998). Fall-run Chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry (Healey 1991). Post-emergent fry seek out shallow, near-shore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and aquatic crustaceans. The optimum temperature range for rearing Chinook salmon fry is 50°F to 55°F (Rich 1997, Seymour 1956) and for fingerlings is 55°F to 60°F (Rich 1997). In preparation for their entry into a saline environment, juvenile salmon undergo physiological transformations known as smoltification that adapt them for their transition to salt water. The optimal thermal range for Chinook during smoltification and seaward migration is 50°F to 55°F (Rich 1997). Chinook salmon addressed in this document exhibit an ocean-type life history, and smolts out-migrate predominantly as subyearlings, generally during April through July. Chinook salmon spend between 2 and 5 years in the ocean (Bell 1991; Healey 1991), before returning to freshwater to spawn. Some Chinook salmon return from the ocean to spawn one or more years before full-sized adults return, and are referred to as jacks (males) and jills (females).

A summary of Chinook salmon abundance (Myers et al. 1998) concluded that habitat loss and/or degradation is widespread throughout the range of listed Chinook salmon and that Chinook salmon in the Mattole River are at "high risk of extinction" (in Meyers et al. based on Higgins et al. 1992) and at "high extinction risk" (in Meyers et al. based on Nehlson et al. 1991). Restoration workers have implemented hatchbox programs since 1980 and have increased survival of early life stages through rearing salmon eggs to juvenile life stages and then releasing juvenile Chinook salmon back into the Mattole River system.

Steelhead (*O. mykiss*)

Winter-run steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996; Nickelson et al. 1992), migrate to spawning areas, and then spawn, generally in April and May (Barnhart 1986). Some adults, however, do not enter some coastal streams until spring, just before spawning (Meehan 1991). Summer steelhead enter freshwater in the spring and summer months, hold in the mainstem river and large tributaries, and then spawn in fall. Both winter-run and summer-run are found in the Mattole River, although summer-run steelhead are considered rare. Only winter-run steelhead are known to exist in the west side streams. Steelhead require a minimum depth of 0.18 m and a maximum velocity of 2.44 m/s for active upstream migration (Smith 1973). Spawning and initial rearing of juvenile steelhead generally take place in small, moderate-gradient (generally 3-5 percent) tributary streams (Nickelson et al. 1992). A minimum depth of 0.18 m, water velocity of 0.30-0.91 m/s (Smith 1973), and clean substrate 0.6-10.2 cm (Nickelson et al. 1992) are required for spawning. Steelhead spawn in 3.9-9.4°C water (Bell 1991). Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching, generally between February and June (Bell 1991). After two to three weeks, in late spring, and following yolk sac absorption, alevins emerge from the gravel and begin actively feeding. After emerging from the gravel, fry usually inhabit shallow water along banks of perennial streams. Fry occupy stream margins (Nickelson et al. 1992). Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992). Steelhead prefer water temperatures ranging from 13-15°C (Reeves et al. 1987). Juveniles live in freshwater from one to four years (usually two years in the California ESU), then smolt and migrate to the ocean in March and April (Barnhart 1986). Winter steelhead populations generally smolt after two years in fresh water (Busby et al. 1996).

Population estimates of juvenile steelhead in the small coastal drainages within the western portion of the KRNCA were made for the 1999 and 2000 field seasons (Engle et al. 2002). At least two age classes were documented in all streams sampled during the two years of study, abundance varied between streams and the highest abundance/stream was 12,856 juvenile steelhead.

Other Fish Species

The tidewater goby (*Eucyclogobius newberryi*), listed as endangered under the ESA, is endemic to California and is distributed in brackish-water habitats along the California coast. However, three sections of coastline in California, characterized by precipitous topography, lack lagoons at stream mouths and therefore form gaps in the distribution of the tidewater goby including from Humboldt Bay to Ten Mile

River (FR Vol. 57, No. 239, Dec. 11, 1992) including the King Range coastline. No sightings of tidewater goby have been documented in the lower Mattole River or other streams draining the KRNCA.

The bocaccio (*Sebastes paucispinis*) rock fish, an ESA Candidate species, lives among rocky reefs and soft ocean bottoms from Kodiak Island, Alaska, to Punta Blanca, Baja California. Populations of bocaccio are separated into northern and southern population segments, and the distribution of the northern population segment includes ocean habitat adjacent to the KRNCA. NOAA Fisheries recently determined that listing bocaccio is not warranted, but will retain bocaccio on the ESA Candidate Species list and continue to monitor its status. The decline of this species is due to a combination of over-harvesting and poor recruitment of young into the population. Although the southern population has substantially declined, measures have been taken, including the elimination of all directed fishing for this species.

Other non-listed fishes have been collected (Busby et al. 1988) from the lower Mattole River including Pacific lamprey (*Lampetra tridentata*), coastrange sculpin (*Cottis aleuticus*), prickly sculpin (*Cottus asper*), threespine stickleback (*Gasterosteus aculeautus*), surf smelt (*Hypomesus pretiosus*), redtail surfperch (*Amphistichus rhodoterus*), shiner surfperch (*Cymatogaster aggregata*), walleye surfperch (*Hyperprosopon argenteum*), staghorn sculpin (*Leptocottus armatus*), speckled sandab (*Citharichthys stigmaeus*) and starry flounder (*Platichthys stellatus*). Pacific lamprey was petitioned for listing under the federal Endangered Species Act in January, 2003, and a status review is currently in preparation.

3.8.3.2 Habitat Status

The Mattole River historically produced large runs of salmon and steelhead; however, habitat quality and quantity has been reduced. Large-scale changes to the Mattole River occurred in response to the 1955 and 1964 floods, which coincided with peak years of logging and road building in the basin. The Mattole watershed has the second highest erosion rate in northern California, second only to the Eel River watershed (Griggs and Hein 1980) and is underlain primarily by young sedimentary rocks which are highly erosive and often incompetent, easily fragmented and cracked. The dominant rock formation is the Franciscan Coastal Belt assemblage and disturbance events in the Mattole watershed profoundly affect hillslope processes and instream habitat. Earthquakes, storm events, and lightning fires are the major natural disturbances, and in combination with human induced disturbance have triggered accelerated erosion. The King Range lies within a very active tectonic setting and has undergone extensive deformation, resulting in extreme geologic and geomorphic instabilities. Topography is steep and rainfall intensities are some of the highest in California. The mainstem Mattole stores massive amounts of sediments contributed from higher gradient tributaries, a condition that is not uncommon in northern California rivers within large, low gradient alluvial valley reaches.

Logging practices in the Mattole River watershed were identified as the "specific critical habitat problem" in a status review by Myers et al. (1998). There were an estimated 3,310 miles of active and abandoned roads in the Mattole River watershed (Perala et al. 1993) and the combined effects of these roads may be the single largest source of fine sediment delivered to the Mattole River. Stored sediments from past logging and road building have severely impacted fish habitat quality and quantity in the mainstem Mattole River. Pools have aggraded, and restoration groups have placed scour structures in some areas in an attempt to restore pool quality. Estuary habitat, a crucial link in the lifecycle of Pacific salmonids, has been reduced by excessive sedimentation, which has also resulted in higher water temperatures and

adverse impacts to food resources. Elevated summer water temperatures are one of the primary limiting factors for salmonids rearing in the Mattole River and impair salmon production at the reach and stream scales. However, smaller tributaries have lower temperatures and provide summer rearing habitat as well as summer low flow inputs to the Mattole River that are critical to the survival of salmonids. Loss of stream shading due to past logging and agriculture, aggradation due to increased sedimentation, and ongoing water withdrawals all continue to reduce instream habitat quantity and quality. Abatement of road-related drainage and erosion hazards is a top priority in terms of reducing upslope sources of erosion and further minimizing impacts to Pacific salmonid habitat. In March of 1994, the Environmental Protection Agency added the Mattole to its list of impaired watersheds (303d list) and a Draft Total Maximum Daily Load (TMDL) document has been prepared (North Coast Regional Water Quality Control Board, 2002).. The Mattole is impaired with regard to temperature, turbidity, and sedimentation. The California Department of Fish and Game recognized problems in the Mattole and recommended a policy of "zero net discharge" of sediment be implemented for all future timber harvest operations.

Within the KRNCA boundary, the west side of the King Range contains 39 perennial streams which range from small, narrow channels containing neither fish nor amphibians to large, broad channels containing both anadromous and resident fishes as well as an assortment of amphibians and riparian-dependent reptiles. Thirteen streams contain anadromous fish populations: Fourmile Creek, Cooskie Creek, Randall Creek, Spanish Creek, Oat Creek, Kinsey Creek, Big Creek, Big Flat Creek, Shipman Creek, Buck Creek, Gitchell Creek, Horse Mountain Creek, and Telegraph Creek. Recent studies (Engle 2001, Baldwin in progress) have found each stream to have relatively small populations of winter-run steelhead. Coho salmon have been observed in Fourmile Creek and Telegraph Creek although these streams do not appear to regularly support populations of coho salmon. A few juvenile coho salmon were captured in Big Creek during the summer of 1999 but extensive efforts to observe and capture coho salmon in 2000 and 2001 found none present. Coastrange sculpin are found in all streams containing steelhead and have also been observed in Willow Creek. Prickly sculpin have been captured in Cooskie Creek. Threespine stickleback have been captured in Cooskie Creek and Big Flat Creek.

In general, the west side streams are short and steep. The Fourmile Creek, Cooskie Creek, and Randall Creek watersheds contain more coast prairies than forests. These watersheds have experienced extensive grazing since the late-1800s. Sheep were the primary livestock in this area until the 1970s when ranchers switched to cattle. The watersheds south of Randall Creek are predominately forested. Some logging has occurred in the some of the watersheds which had private ownership but logging in these watersheds was not conducted at nearly the levels experienced in the Mattole watershed.

The largest streams, Big Creek and Big Flat Creek, appear to transport a relatively high volume of bedload originating from a number of large landslides found in their headwaters and major tributaries. In general these streams tend to have cool summer water temperatures, the notable exception to this is Cooskie Creek which regularly exceeds 80° F during summer months. Fish habitat quality in these streams is generally good but quite variable depending on channel morphology and gradient. None of these streams forms an estuary, even during periods of high streamflow.

3.8.4 Management Issues/Practices

Currently, public lands in the Mattole watershed are managed consistent with the 1994 Northwest Forest Plan (NWFP). A primary component of the NWFP, the Aquatic Conservation Strategy (ACS), was designed to protect salmon and steelhead habitat by maintaining and restoring ecosystem health at watershed and landscape scales. Restoration has been championed by local watershed and salmon restoration groups in cooperation with the BLM since the 1970s and projects have been focused in the estuary, the lower river, and tributaries of the Mattole River. Livestock grazing continues in the lower Mattole watershed up to the lower North Fork and also on lands to the south of the Mattole within the KRNCA, including 11,100 acres within the following allotments: Spanish Flat, Strawberry Rock, Windy Point, and HJ Ridge. Timber harvest continues on private and industrial timberlands in forested uplands and throughout the upper watershed. BLM also maintains a campground and trailhead on the south side of the mouth of the Mattole and recreation (hiking and camping) is a primary use.

Although some of the above land uses continue to impact the watershed, on-going restoration efforts have made substantial progress improving habitat conditions. In general, approximately half of the watershed areas in the KRNCA are in relatively stable condition and half of the area has been impacted by past logging and road building. Within the Mattole Basin, parts of Bear and Honeydew Creeks are the least impacted by historic and ongoing land uses and these tributaries have the highest potential for providing refugia habitat for Pacific salmonids due to current conditions, land ownership patterns and potential for restoration.

Bear Creek lies within the KRNCA and is the third largest tributary of the Mattole River. Bear Creek provides approximately 19 miles of spawning and rearing habitat for Pacific salmonids and the watershed is comprised of predominantly public lands. Most of the land acquired by BLM was previously owned and logged by large timber companies. Many miles of abandoned roads were present on the acquired lands in the watershed and BLM has instituted an ongoing program of road rehabilitation to reduce the potential for road failures and chronic inputs of sediment. Currently there are arterial gravel roads that transect the Bear Creek watershed and segments have been identified as minor sediment sources. Proper maintenance, upgrades, and rehabilitation of erosion features have been identified and implemented to protect salmonid habitat from further sedimentation. Many homesteads and some agricultural operations obtain water from Bear Creek, which reduces habitat quantity and quality particularly during summer low flows. One grazing allotment currently exists in this watershed. Available information on physical habitat parameters indicates that instream habitat is recovering from floods, fire, and past land uses and riparian vegetation is well established. However, later seral coniferous riparian forests that provided large wood to streams will not likely return to pre-1950s levels for centuries.

Honeydew Creek is the fourth largest tributary of the Mattole River and approximately 69 percent of the watershed is in public ownership. The portion of this watershed within the KRNCA contains headwater tributaries that drain the north and east slopes of the King Range. The watershed contains seven sub-watersheds and of these watersheds, the upper mainstem and the West Fork have had minimal human impacts and could be characterized as refugia relative to aquatic habitat conditions. In contrast, the East Fork of Honeydew Creek, Bear Trap Creek, and High Prairie Creek have been intensively logged and grazed. Large scale erosion in this watershed along with removal of large streamside conifers contributed to simplification of the stream channel and reduced habitat quality and quantity for native fishes. The lower four miles of Honeydew Creek are in a broad alluvial valley where instream habitat has been

impacted by grazing, logging, residential development, water withdrawals, and sediment from logging and roads. Higher gradient channels at upper elevations transport sediment loads downstream and instream habitat exhibits less sedimentation effects than lower gradient channels. Although summer water temperatures are below lethal levels for salmonids, temperatures have been at stressful levels for long periods during the summer. However, Honeydew Creek is still three to five degrees below the temperatures in the Mattole River and comprises a significant portion of summer low flow inputs to the Mattole River.

The upper watershed, including the upper mainstem Honeydew Creek, West Fork and Upper East Fork, has not been as subjected (relative to other areas in the watershed) to impacts of high road density, timber harvest or vegetation type conversion. Portions of the Upper East Fork of Honeydew Creek downslope of the King Range Road experienced intensive tractor-based logging in the 1960s, while the watershed area upslope of the road has not been logged. Spawning habitat for coho and Chinook salmon is limited to areas of gentle gradient (2 percent or less), and significant low gradient sections are found in the lower mainstem and East Fork. Steelhead are able to access and spawn in steeper reaches. These steeper reaches have also been subject to chronic sediment inputs. Occasional sediment pulses, however have tended to maintain habitat quality and transport sediment downstream. Thus, Honeydew Creek provides more habitat for steelhead than coho or Chinook salmon. BLM (1996) reported that fish habitat in the steeper tributaries of Honeydew Creek is in good condition with the exception of Bear Trap Creek. The road network on public lands has been assessed by BLM and King Range Road had been identified as a concern because of the potential for culvert failures and sediment inputs to streams. In 1996, the northern-most 3.5 miles of the King Range Road, within the Upper East Fork of Honeydew Creek, was removed, which has reduced chronic sedimentation and potential catastrophic failures from plugged culverts and channel diversions. Continued road maintenance on all roads has been identified as a critical component of aquatic habitat protection and recovery.

Mill Creek is a tributary of primary importance to the lower Mattole River as it is the most significant source of cold water (Mattole Restoration Council 1995), has excellent water quality, and supports a population of SONCC coho salmon, as well as steelhead. Mill Creek is unique among Mattole River tributaries as instream habitat shows little evidence of sedimentation from past floods and logging. The lower mile of Mill Creek has been the most utilized by salmonids. The Lighthouse Road culvert, within the lower reaches of Mill Creek, had been a barrier to migration until modified in 1977 and 1980. In 2002, this culvert was replaced with a bridge to allow fish passage at all life stages. This stream has high potential as refugia for recovery of populations in the Mattole basin.

In addition, seventeen coastal streams drain the western portion of the KRNCA, flowing directly into the Pacific Ocean; most of them are too small to support fish populations. Seven of these streams were studied by Humboldt State University students in 1999-2000 including Cooskie, Randall, Spanish, Oat, Kinsey, Big, and Big Flat Creeks. Researchers (Engle et al. 2002) concluded that all of the coastal streams in the KRNCA are unique with respect to morphology, instream habitat and species composition. In addition, studies indicated that steelhead and resident trout utilize these small, steep coastal streams and they may be uniquely adapted to extreme habitat conditions including high stream energy, low summer base flows, high sediment supply and transport, and a lack of estuary habitat. Disturbances in these small watersheds have included cattle grazing, logging (limited areas), recreation/hiker use, slides, fires, and floods. Other studies of west side King Range streams are currently in progress.